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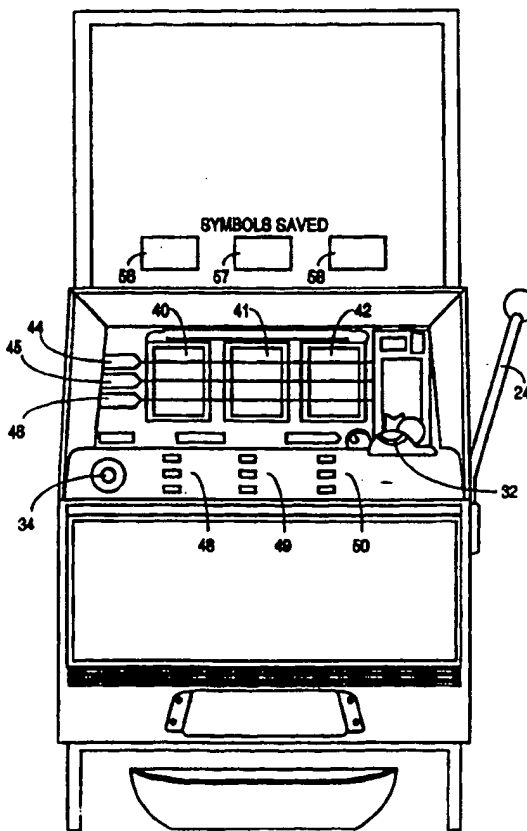
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(21) International Application Number: PCT/US97/17908 (22) International Filing Date: 8 October 1997 (08.10.97) (30) Priority Data: 08/735,908 25 October 1996 (25.10.96) US (71) Applicant: SIGMA GAME INC. [US/US]; 7160 South Amigo Street, Las Vegas, NV 89119 (US). (72) Inventor: CRAWFORD, Curtis, J.; 280 Plaza Carmelina Court, Henderson, NV 89014 (US). (74) Agents: OGONOWSKY, Brian, D. et al.; Skjerven, Morrill, MacPherson, Franklin & Friel LLP, Suite 700, 25 Metro Drive, San Jose, CA 95110 (US).			(81) Designated States: AU, CA, JP, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published With international search report.

(54) Title: SLOT MACHINE WITH SYMBOL SAVE FEATURE

(57) Abstract

A method for operating a rotating reel type slot machine, or a video machine which depicts rotating reels, is described herein which allows a player to save in memory one or more symbols from one or more previous games and use those symbols in a current game to obtain a winning combination. The display glass of the slot machine contains an area for displaying the symbols which have been saved.



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SLOT MACHINE WITH SYMBOL SAVE FEATURE

FIELD OF THE INVENTION

5 This invention relates to slot machines and, in particular, to an additional playing feature for a slot machine.

BACKGROUND OF THE INVENTION

10 Fig. 1 illustrates the well known basic circuitry of a modern slot machine 10 which incorporates rotating reels. In such a slot machine 10, each of the reels 12, 13, and 14 has a variety of symbols printed on its periphery. Each of the reels 12-14 is driven by a separate stepper motor 16 which rotates in response to pulses from a CPU 18. When the pulses to a stepper motor 16 are terminated, the reel stops abruptly.

15 In modern slot machines, the stopping positions of the reels 12-14 are predetermined using a random number generator consisting of a random number generator program in the program ROM 20 carried out by the CPU 18. The required number of pulses to the three stepper motors are then generated to display the symbol combination at the predetermined reel positions.

20 In one common type of slot machine, the number of pulses after the reel has reached a zero position are counted to determine the final position of the reels. In another type of machine, each of the reels has tabs that are sensed by a photodetector to determine the angular displacement of the reel and thus the final displayed symbol. Other means for detecting the positions of the reels exist and
25 are well known.

 A money detector 22, which may detect coins or other currency, issues a command to the CPU 18 that the slot machine 10 is ready to be played. The player may then pull a handle 24 or press a button to initiate play.

After the reels have stopped, and the CPU 18 determines the final stop positions, the stop positions are then applied to a pay-table ROM 26, which cross-references the final displayed symbols with a monetary payout to the player. This payout is then conveyed to a payout mechanism 28 which issues coins or credits to the player. A display 30 may also be activated, signalling a win to the player.

The above general description of a modern slot machine would be well known in the art, and such a programmable machine offers great advantages. Slot machines are varied by simply changing the operating program in the program ROM 20 and the award program in the pay-table ROM 26. The front glass of the slot machine is also changeable to convey particular features of the machine.

Additional detail of such conventional slot machines is found in U.S. Patent No. 4,095,795 to Saxton et. al.; 4,448,419 to Telnaes; and 4,573,681 to Okada, all incorporated herein by reference.

One well known award criterion for a 3-reel slot machine is the matching of symbols in a horizontal direction. After each game, the player again pulls the handle so that each game is completely independent of all previous games.

Although the slot machine of Fig. 1 is very successful, even more player appeal would be created by allowing the player additional possibilities for winning.

SUMMARY

A method for operating a rotating reel type slot machine, or a video machine which depicts rotating reels, is described herein which allows a player to save in memory one or more symbols from one or more previous games and use those symbols in a current game to obtain a winning combination. The invention may be implemented by relatively minor changes in the software code in the program ROM and the pay-table ROM of a conventional slot machine.

The display glass of the slot machine contains an area for displaying the symbols which have been saved for that reel position.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates well-known circuitry for operating a slot machine.

Fig. 2 illustrates the circuitry of Fig. 1, but augmented to incorporate the present invention.

Fig. 3 is a front view of a slot machine incorporating the present invention.

Fig. 4 is a flow diagram illustrating the basic steps carried out by the slot machine in accordance with the present invention.

Fig. 5 illustrates circuitry similar to Fig. 2, but modified for controlling a video slot machine displaying rotating reels.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Fig. 2 illustrates the circuitry used in a slot machine in accordance with the present invention. Elements identified with the same numerals in the various figures may be identical and will not be redundantly described.

The slot machine of Fig. 2 performs the same functions as the conventional slot machine of Fig. 1 but has an additional feature. This feature will be referred to as a symbol save feature, which allows a player to save any displayed symbol for use in a subsequent game. Symbols may be saved manually by pressing a button, or, alternatively, the machine may automatically save special symbols for the player's use in later games. A description of the invention will be presented with reference to Fig. 2, the front view of a slot machine in Fig. 3, and the flow chart of the slot machine operation in Fig. 4.

In step 1, a coin is deposited through slot 32 (Fig. 3) and is detected by a coin detector 22 (Fig. 2). A paper currency slot and reader may also be incorporated in the slot machine of Fig. 3. The detection of the coin and the pulling of handle 24, or the pressing of button 34, initiates a next game, as indicated in step 2 of Fig. 4.

A CPU 36 (Fig. 2), under control of a program ROM 38, rotates the reels 12-14 by issuing pulses to stepper motors 16, as indicated by step 3 in Fig. 4. In step 4, a random number generator in the program ROM 38 selects the final reel positions for reels 12-14. CPU 36 issues the required number of pulses to stepper
5 motors 16 in order to cause the reels 12-14 to reach their final positions. The positions of the reels 12-14 may be determined by either counting the number of pulses to each stepper motor 16 or by counting pulses generated by a photo-optical element which detects tabs around the periphery of each of reels 12-14. Such methods of selecting a final reel position and stopping the reels at the selected reel
10 positions are well known and commonly used in the art. In step 5, the reels are stopped at their selected positions.

The reels are displayed through display windows 40, 41, and 42 in Fig. 3. A slot machine incorporating this invention may include more than 3 reels. In the particular embodiment shown in Fig. 3, three consecutive symbols on each of reels
15 12-14 are displayed through the display windows 40-42. A symbol may be any image and may even be a blank. Three paylines 44, 45 and 46 are printed on the display glass of the slot machine to identify the paylines which are applicable for a particular play. Typically, the deposit of one coin will activate the center payline 45, and additional coins will activate the paylines 44 and 46. A winning
20 combination of symbols appearing across any activated payline will result in a win for that player.

In step 6 of Fig. 4, a pay-table ROM 48 (Fig. 2) is addressed with an address based upon the number of coins played and the final reel positions. For example, if three coins were played, a winning combination across any of the three
25 paylines 44-46 would be acknowledged by the pay-table ROM 48 as a win. The pay-table ROM 48 provides a signal to CPU 36 to control a payout mechanism 28 to provide the number of coins or credits to the player corresponding to the winning symbol combination, as shown in step 7 of Fig. 4.

5 The operation of the preferred slot machine, thus far, has been that of a conventional slot machine. The present invention can also be used in slot machines which have only a single payline or which use a CRT or other flat screen display to represent the rotation of reels rather than provide actual mechanical reels.

10 After the reels have stopped, the player may elect to save one or more symbols displayed for each reel position. This may be accomplished by pressing one or more buttons 48, 49, and 50 (Fig. 3) associated with each reel. In one embodiment of a slot machine having three paylines, there are three buttons per reel to select a symbol on any one of the paylines. Hence, up to three symbols per reel may be saved. In another embodiment, only one symbol per reel can be saved.

15 In another embodiment, only special symbols may be designated by the machine as the symbols applicable to the symbol save feature. In such an embodiment, the machine itself may automatically save these special symbols as they appear in the display windows 40-42.

The manual saving of symbols by buttons 48-50 or the automatic saving of symbols is indicated by the symbol save controller 52 in Fig. 2 and indicated by step 8 in Fig. 4.

20 The saved symbols are stored in a symbol save memory 54 (Fig. 2), and the save symbols are displayed to the user in display areas 56, 57 and 58 in Fig. 3. In one embodiment, an image of the saved symbol(s) is illuminated in areas 56-58 in Fig.3. Any arrangement of a display for displaying the saved symbols to the player may be used, and such a display is designated as display 60 in Fig. 2.

25 In the preferred embodiment, any symbol from a reel which is saved by the player or the machine only applies to that same reel position in subsequent games. Thus, the saved symbol originally displayed in display window 40 will appear in display area 56 and can only be later used in combination with symbols displayed in windows 41 and 42 or with symbols saved in display areas 52 and 58. In

another embodiment, the origin of the saved symbol is not relevant, and the saved symbol(s) can be used with any reel combination.

5 The player may then deposit more coins and initiate a next game, as shown in step 9 of Fig. 4. The step of saving symbols, instead of being conducted before additional coins or credits are wagered, may be conducted after additional coins or credits are wagered but before the initiation of the next game. Again, the reels are rotated, the final reel positions are randomly selected, and the reels are stopped, as shown in steps 10, 11, and 12, respectively, in Fig. 4.

10 A winning combination of symbols may now be determined by using the currently displayed symbols by the reels 12-14 and the saved symbols from one or more previous games. The pay-table ROM 48 is then provided an address which may be based upon, for example, the number of coins played, the saved symbols, and the symbols displayed by the reels to determine whether there is a winning combination of symbols and to determine the award to be played to the player, as shown in step 13 of Fig. 4. Other criteria for addressing the pay-table ROM 48 or
15 other circuitry for providing an award to the player may also be used.

The output of the pay-table ROM 48 is provided to CPU 36, which then controls the pay-out mechanism 28 to provide the corresponding award to the player for the winning symbol combination, as shown in step 14 of Fig. 4, and the display of the saved symbols is extinguished.
20

If a winning combination used any of the saved symbols, the saved symbols are canceled, as shown in step 15 of Fig. 4, and the display of the saved symbols is ceased.

25 The player may now select additional symbols to save and store in the symbol save memory 54, as illustrated by the return path in Fig. 4.

Fig. 5 illustrates the circuitry used in a video slot machine which displays an animated version of rotating reels on a CRT 62. A video controller 64 controls CRT 62 and receives commands from CPU 36. One skilled in the art would understand the requirements for video controller 64 and CPU 36, since these

devices would be generic to a wide variety of video slot machines. In a video slot machine, a separate display to identify the saved symbols is not required since the saved symbols would be displayed on CRT 62.

One skilled in the art could easily modify conventional slot machine programs stored in a program ROM to incorporate the symbol save feature of this invention. One skilled in the art could also easily modify the conventional program in a pay-table ROM to take into account the symbols saved in memory 54 when determining whether a winning combination exists. The symbol save controller 52 may easily be implemented by determining the displayed symbol corresponding to buttons 48-50, since the final positions of the reels are already known by CPU 36. Accordingly, one skilled in the art may implement numerous embodiments of this invention without further technical description.

While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects and, therefore, the appended claims are to encompass within their scope all such changes and modifications as fall within the true spirit and scope of this invention.

CLAIMS

What is claimed is:

1. A slot machine comprising:

a display portion displaying a plurality of rotatable reels, each reel
5 having a plurality of symbols on its periphery;

a means for rotating said reels and stopping said reels such that at
least one symbol on each reel is displayed to a player of the slot machine
across at least one horizontal payline;

a selector for allowing said player to store at least one of said
10 displayed symbols as at least one saved symbol in a memory for use in a
subsequent game; and

an award means for awarding a payment to said player for winning
combinations of symbols using both one or more saved symbols and
currently displayed symbols for determining a winning combination of
15 symbols.

2. The slot machine of Claim 1 wherein said display portion comprises
said rotatable reels rotated by a motor.

20 3. The slot machine of Claim 1 wherein said display portion comprises
an electronic display for displaying said rotatable reels on a display screen.

4. The slot machine of Claim 1 wherein said selector comprises at
least one button associated with each of said rotatable reels, wherein depression of
25 said at least one button stores a displayed symbol on an associated reel as a saved
symbol in said memory for use in a subsequent game.

5. The slot machine of Claim 1 wherein said selector comprises a
different selector for each of said rotatable reels.

6. The slot machine of Claim 1 wherein said rotatable reels comprise a first reel, a second reel, and a third reel, said selector comprising a different selector for each of said rotatable reels, wherein activating a selector for one of said rotatable reels causes a displayed symbol on said one of said rotatable reels being saved for use in combination only with symbols displayed by the remaining rotatable reels.

7. The slot machine of Claim 1 wherein said rotatable reels comprise a first reel, a second reel, and a third reel, said selector comprising a different selector for each of said rotatable reels, wherein activating a selector for one of said rotatable reels causes a displayed symbol on said one of said rotatable reels being saved for use in combination with displayed symbols on any of said rotatable reels.

8. The slot machine of Claim 1 further comprising a means for cancelling one or more of said saved symbols in said memory after a payment to said player has been made for a winning combination utilizing one or more of said saved symbols.

9. The slot machine of Claim 1 further comprising a display area for displaying saved symbols.

10. The slot machine of Claim 1 further comprising a display area associated with each of said rotatable reels for displaying a saved symbol associated with a respective one of said reels.

11. A method for operating a slot machine comprising the steps of:
rotating reels in said slot machine, each reel having a plurality of symbols around its periphery;

stopping said reels to display a particular symbol combination;
selecting one or more displayed symbols to be saved and stored in a
memory;
rotating said reels subsequent to said step of selecting;
5 stopping said reels to display a particular symbol combination; and
determining a payment to a player for a winning combination of
symbols using both saved symbols and currently displayed symbols for
determining a winning combination of symbols.

10 12. The method of Claim 11 wherein said step of selecting comprises
pressing a button associated with each of said reels to save a symbol displayed by
an associated reel.

15 13. The method of Claim 11 wherein symbols saved during said step of
selecting are used in combination with any other symbols displayed by said reels
for determining a winning combination of symbols.

20 14. The method of Claim 11 wherein symbols saved during said step of
selecting are used in combination only with symbols on reels other than the reel
associated with the saved symbol, for determining a winning combination of
symbols.

25 15. The method of Claim 11 further comprising the step of cancelling
one or more saved symbols once it has been determined that a winning
combination of symbols uses said one or more saved symbols in combination with
one or more currently displayed symbols on said reels.

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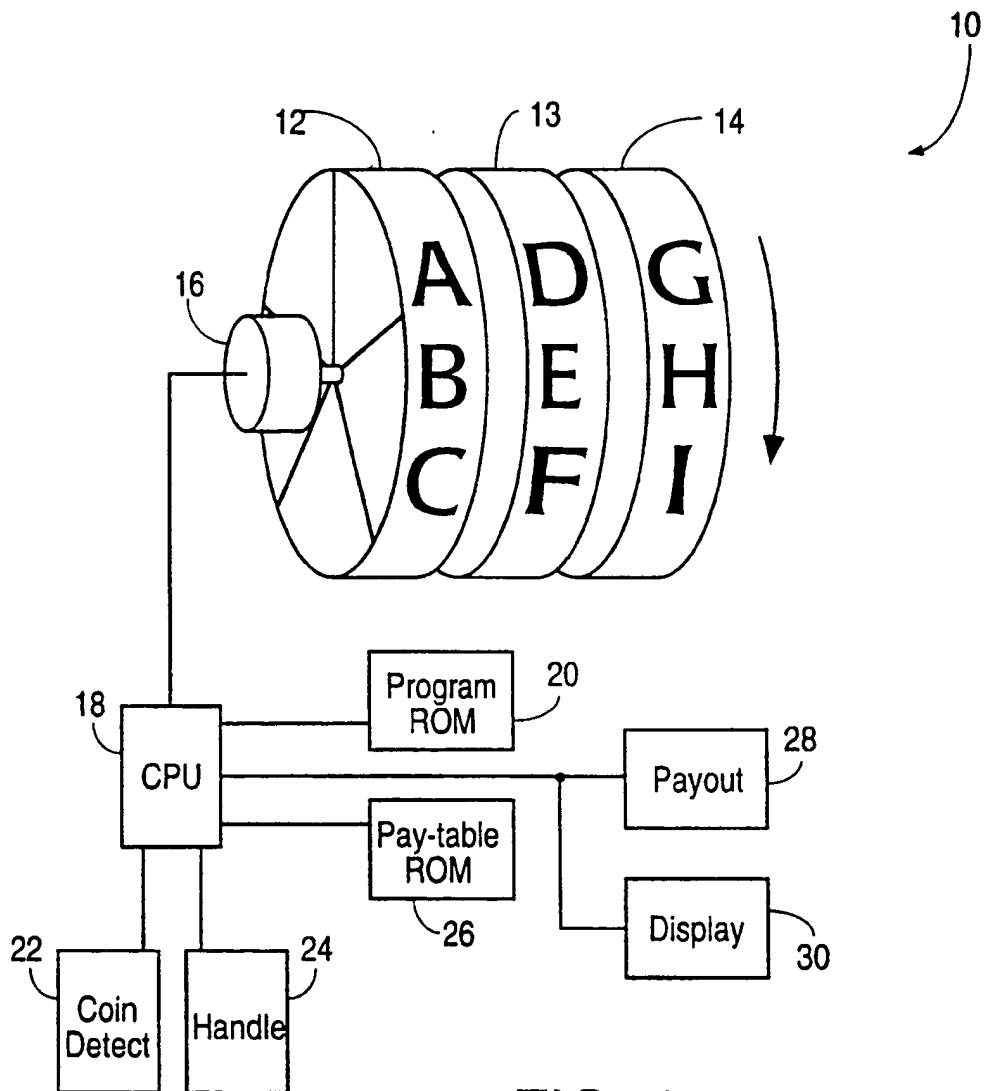


FIG. 1
(Prior Art)

2/5

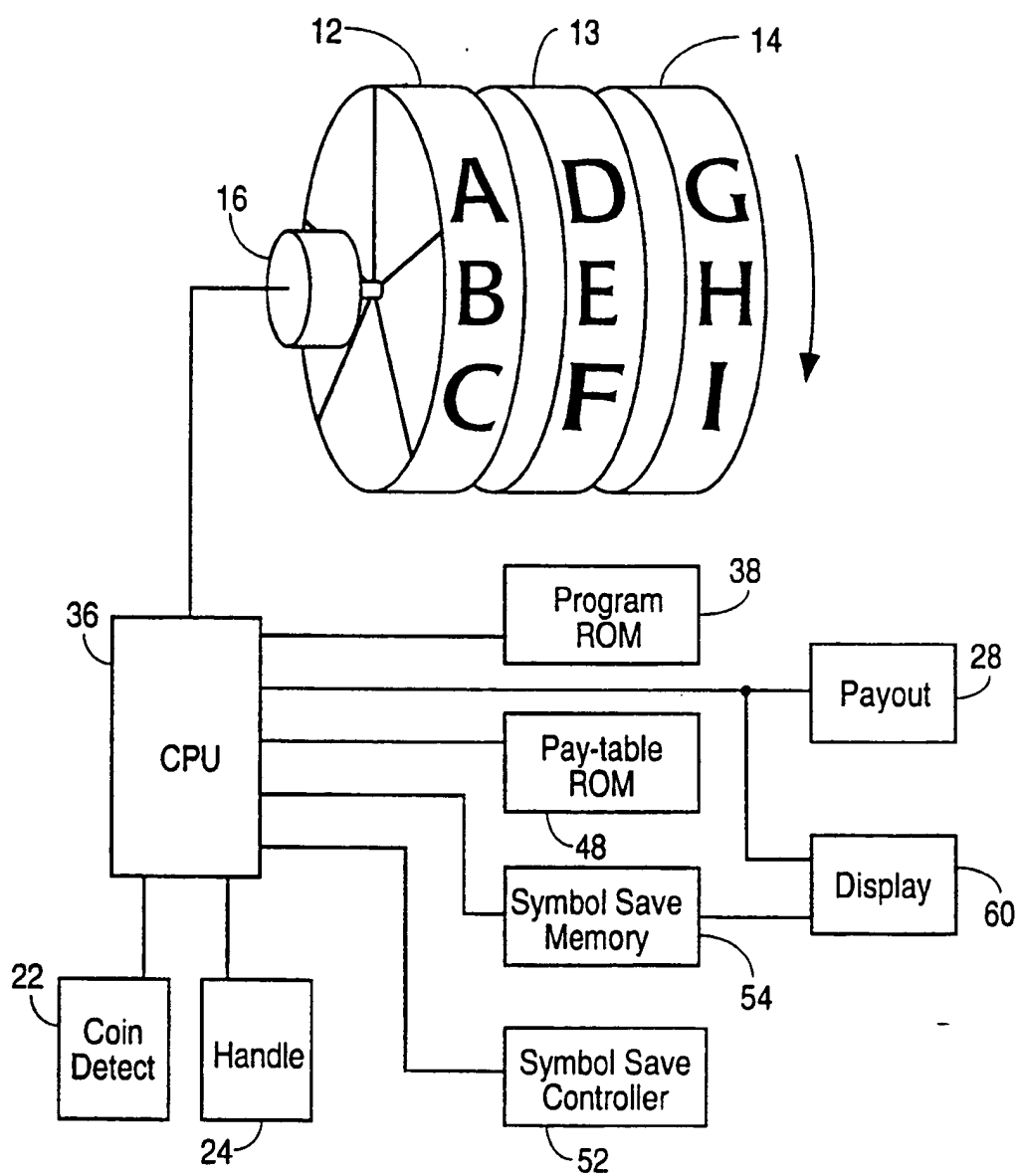


FIG. 2

SUBSTITUTE SHEET (RULE 26)

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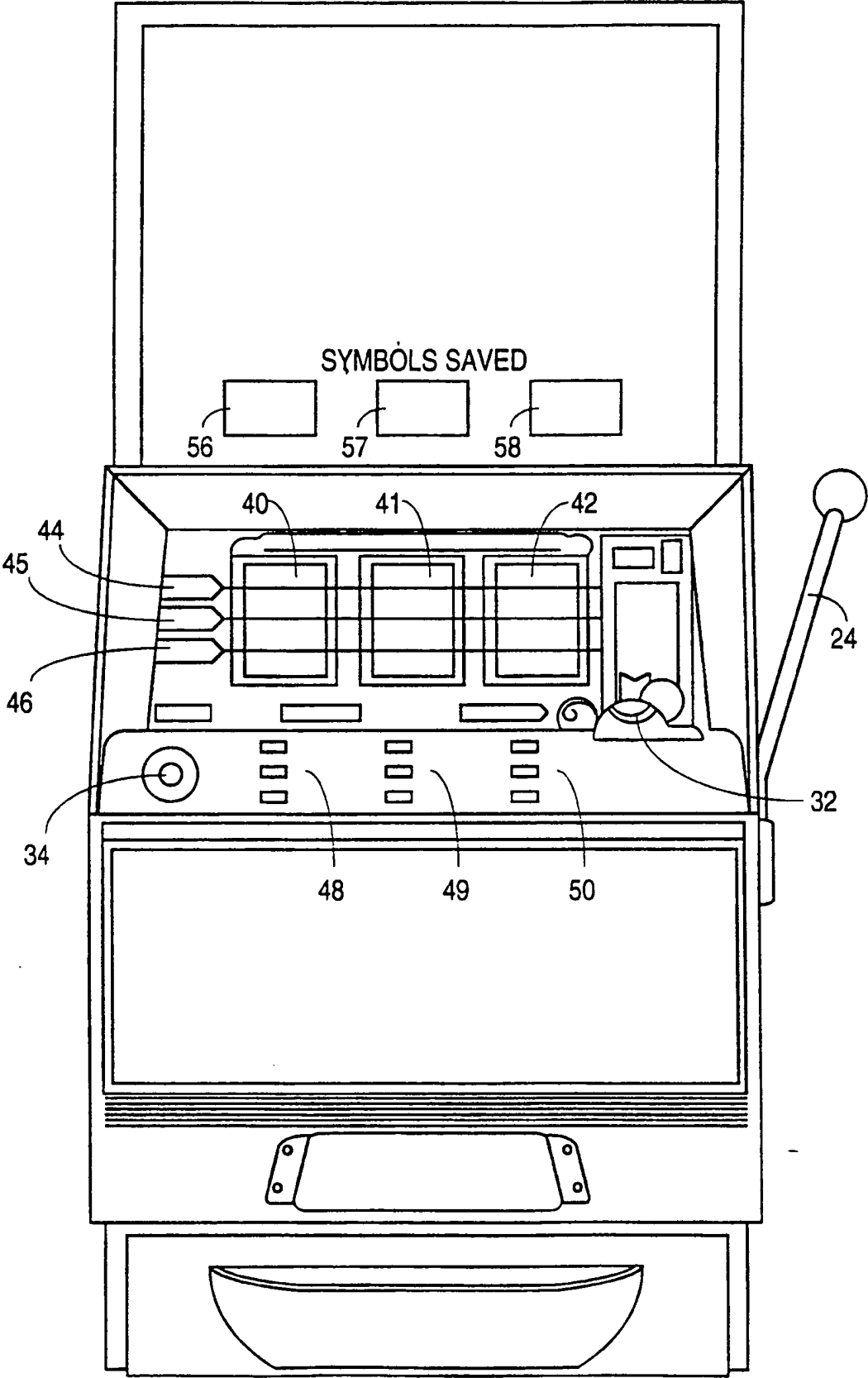
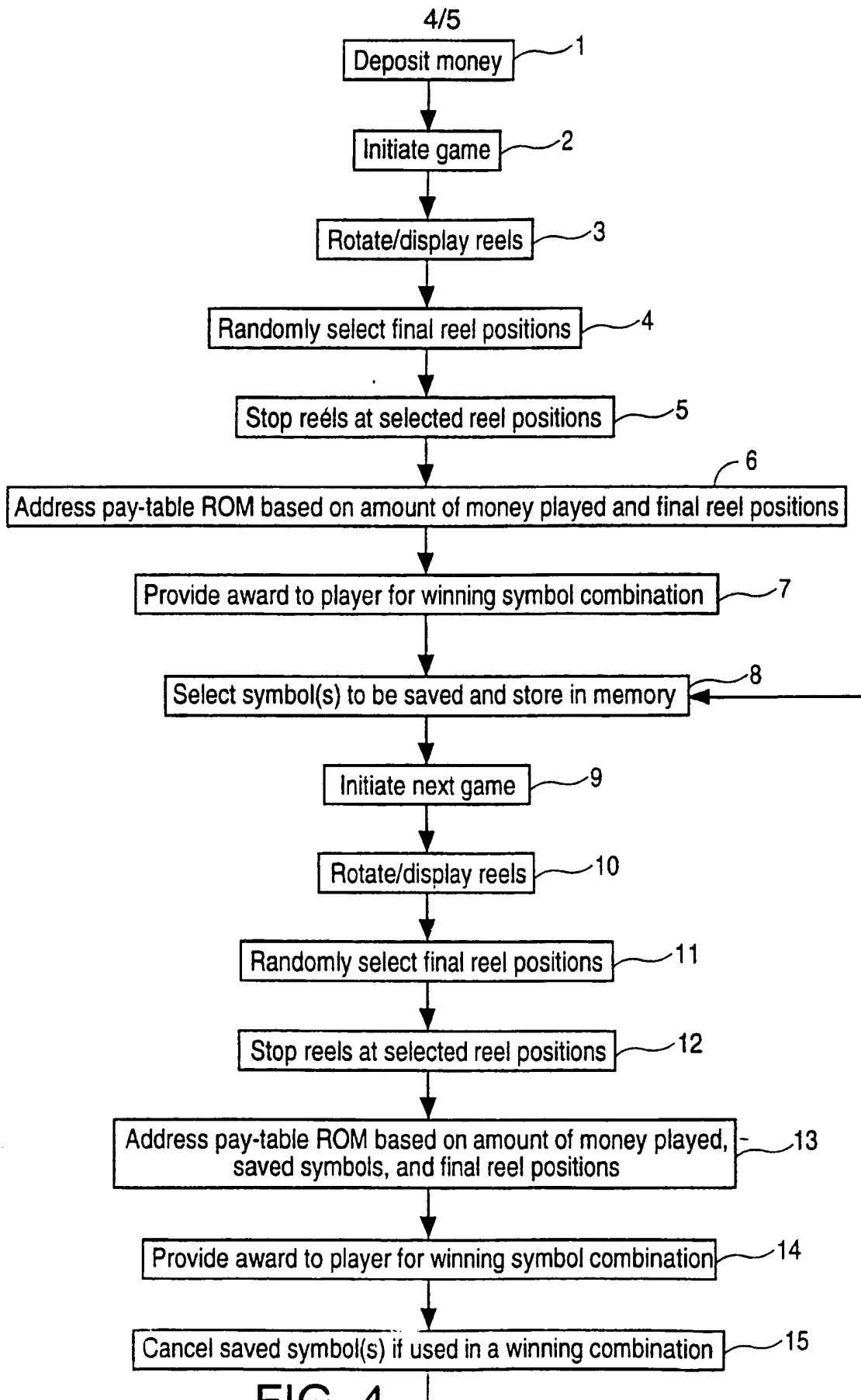


FIG. 3
SUBSTITUTE SHEET (RULE 26)



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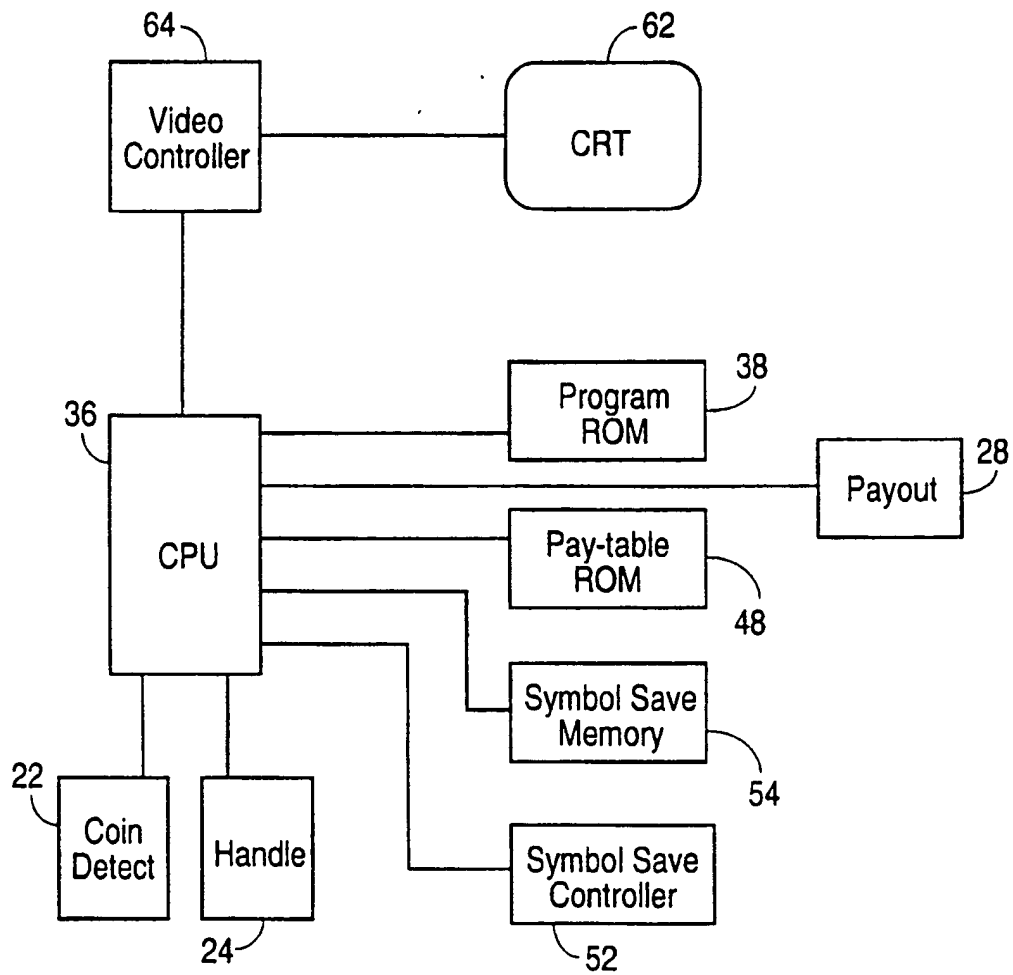


FIG. 5

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 97/17908

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G07F17/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No:
X	GB 2 243 236 A (COINMASTER) 23 October 1991	1-6. 8-12.14. 15
Y	see page 5, line 2 - line 32 see page 6, line 24 - line 30 see page 7, line 11 - line 26: figure 1 ---	7.13
Y	EP 0 609 637 A (SEGA) 10 August 1994 see column 3, line 13 - column 4, line 2: figure ---	7.13
X	GB 2 050 028 A (BARCREST) 31 December 1980	1.2.4-6. 8-12.14. 15
A	see page 2, line 30 - line 61: figures ---	3.7.13
A	DE 44 21 857 A (NSM AG) 4 January 1996 see column 3, line 26 - line 59: figures -----	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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